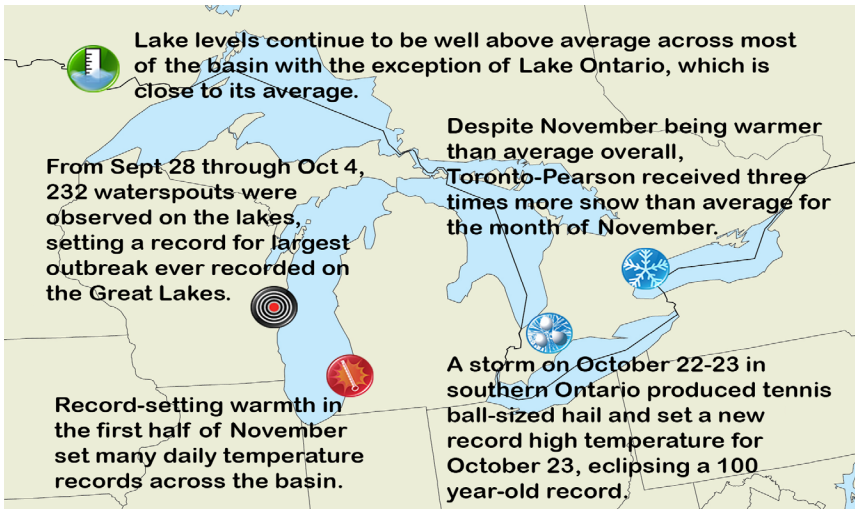
Quarterly Climate Impacts and Outlook

Great Lakes Region

December 2020

Great Lakes Significant Events – *for September - November 2020*



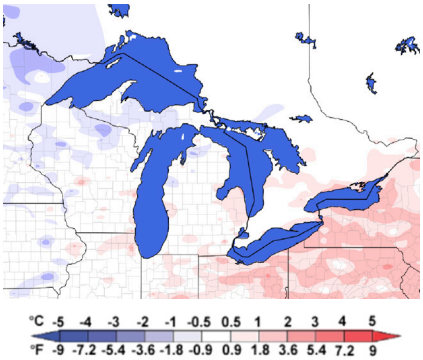
While conditions were overall fairly normal throughout the fall, record-setting warmth, especially in the first half of November, was the most notable event this season.

Many new daily maximum temperature records were set, stretching from Duluth, MN to Buffalo, NY and Toronto, ON in the first two weeks of November. On November 4 in Alpena, MI, a record monthly high temperature for November of 25°C (77°F) was tied. The November 4-11 heat spell was the longest and warmest recorded at Toronto Pearson Airport. Chicago set a new record with seven days in November having temperatures above 21°C (70°F).

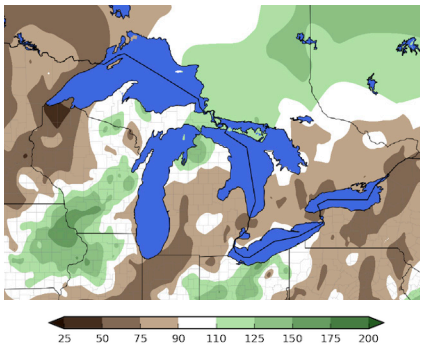
On November 15, a storm across the eastern Great Lakes region and southern Ontario resulted in strong wind gusts, high waves, storm surge and shoreline flooding. This system produced an EF-1 tornado in Georgetown, ON. A seiche event on Lake Erie was also observed, where there was a 4.3 m (14 ft) difference in water level between Buffalo, NY and Toledo, OH. Widespread damage occurred from this storm system.

Regional Climate Overview – *for September - November 2020*

Fall 2020 Temperature Departure from Normal



Fall 2020 Precipitation Percent of Normal



U.S. normals based on 1981-2010.
Canadian normals based on 2002-2019.

Temperature and Precipitation

September temperatures were generally within 1°C (2°F) of normal, except in the Superior basin which was colder. October temperatures ranged from 5°C (9°F) below normal in the Superior basin to near normal in the Erie and Ontario basins. November was up to 5°C (9°F) warmer than normal. Fall temperatures ranged from 2°C (4°) below normal in the Superior basin to 2°C (4°) above normal in the Erie and Ontario basins.

September and November were drier than average, with the overall basin seeing 75% of average and 78% of average, respectively. October precipitation was near or above average, with the overall basin seeing 109% of average. Fall precipitation was below or near average, with the basin seeing 87% of average.

Current Water Levels

During the fall, water levels declined more than average for some lakes, while others declined closer to their averages. However, all the lakes end November with water levels that are below last year's levels, but still above average. In September, Lake St. Clair tied its record high monthly level, which was the only record high that occurred on the Great Lakes this fall. The highest recorded water levels for October and November on Lakes Michigan-Huron, St. Clair, and Erie, occurred in the fall of 1986, which was extremely wet. This caused water levels to rise from September to October that year in a time when water levels typically decline. Therefore, although water levels were below their record high levels this fall, water levels have remained well above average.

Lake	End of Nov. 2020 Level Compared to:		Change in Level from Beg. of Sept. to End of Nov.:	
	Average for Nov.	Nov. 2019	2020 Change in Level	Average Change in Level
Sup.	+25 cm	-8 cm	-10 cm	-9 cm
Mich.-Huron	+80 cm	-10 cm	-24 cm	-18 cm
Erie	+65 cm	-4 cm	-24 cm	-23 cm
Ont.	+7 cm	-40 cm	-38 cm	-30 cm

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Regional Impacts – *for September - November 2020*

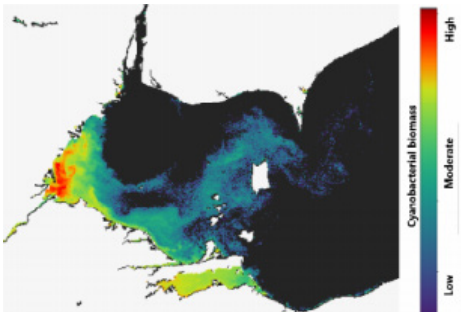
Several high wind events occurred in November. On November 1, a strong storm resulted in hurricane-strength winds of 119 km/h (74 mph) winds being recorded near Keweenaw Point, MI. A strong wind storm on November 15 resulted in many wind gust reports of 95 km/h (60 mph) or greater in Ohio, New York, and Ontario. In St. Catharines, ON a wind gust of 141 km/h (87 mph) was observed. A 2 m (6.6 ft) storm surge and high waves of 5 m (16.4 ft) were observed across Lake Erie, leaving residents to evacuate their homes. This system also left 500,000 customers without power in southern Ontario, nearly 200,000 in Michigan and 45,000 in New York.

Agricultural impacts have overall been less severe this fall than last year. Due to warmer and drier conditions, fall harvest has generally been quite good across the basin. Abnormal dryness and drought in New York, however, caused some concern as low flows, dry wells, and water shortages resulted in water use advisories being issued and caused some communities to declare a state of emergency.

The Harmful Algal Bloom (HAB) on Lake Erie this year was forecast to have a severity of 4.5, which would indicate a mild bloom, and is much less severe than the 2019 bloom that had a severity of 7.3. The season ended with a bloom having a severity of only 3. Strong winds in early September led to an early end of the bloom, which may have partially contributed to the less severe bloom than forecast.

Downed trees in NY. (credit: J. P. McCoy)

Fall Creek, NY. (credit: B. Parker)



Peak 2020 bloom from Aug 21-31. (NOAA)

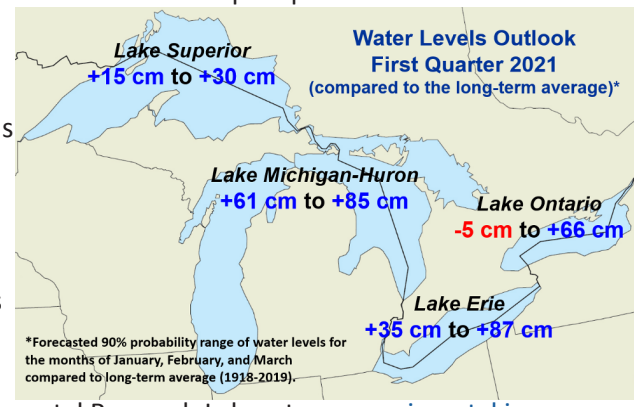
Regional Outlook – *for January - March 2021*

Temperature and Precipitation

The outlook from American and Canadian forecasters shows an enhanced chance for above-normal temperatures in the basin, except for equal chances for above-, below- and near-normal temperatures in the Lake Superior basin according to U.S. forecasters. The precipitation outlook shows enhanced chances for above-normal precipitation. A La Niña Advisory was issued due to an increased likelihood (95% chance) of conditions remaining through the winter.

Great Lakes Water Levels

The December water level forecast indicates that in the first quarter of 2021, Lake Superior will be continuing its seasonal decline, Lake Ontario will be in its period of seasonal rise, and Lakes Michigan-Huron, St. Clair, and Erie, will reach their seasonal low and begin their seasonal rise. With La Niña, wetter conditions are favored. However, air temperature will be important to whether that precipitation would fall as snow or rain, which would affect the water supply to the lakes. Rain would have a more direct impact to water supply conditions, while snow tends to have a delayed response as it takes time to melt and become runoff. There will still be a risk for storms to cause high winds and waves that may lead to shoreline flooding and erosion.



NOAA's Great Lakes Environmental Research Laboratory experimental ice cover projection over the Great Lakes projects ice cover to be 27% this winter, while the historical average for the basin is 55%. The preliminary projection for each lake is: 27% for Lake Superior, 22% for Lake Michigan, 42% for Lake Huron, 66% for Lake Erie and 9% for Lake Ontario.

Partners

- *Midwestern Regional Climate Center*
- *Environment and Climate Change Canada*
- *Agriculture and Agri-Food Canada*
- *Northeast Regional Climate Center*
- *Great Lakes Region State Climatologists*
- *NOAA*
  - *NCEI*
  - *GLERL*
  - *CoastWatch Great Lakes Node*
  - *Great Lakes Sea Grant Network*
  - *North Central River Forecast Center*
  - *Ohio River Forecast Center*
  - *Climate Prediction Center*
  - *Office for Coastal Management*
- *GLISA*
- *US Army Corps of Engineers, Detroit District*
- *NIDIS*
- *USDA Midwest Climate Hub*

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